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Regional Natural Park**

Pierre-Henri Bombenger, Jean-Philippe Waaub

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The Integrated Rural Planning System,  
an evaluative and participative decision support system to implement  
sustainable urban development  
in the Ballons des Vosges Regional Natural Park

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**Pierre-Henri BOMBENGER**

Ph.D. student in Environmental sciences (Canada) and Regional planning (France)  
Geography Department, Université du Québec à Montréal (UQAM, Canada)  
GEIGER, Groupe d'Études Interdisciplinaires en Géographie et Environnement Régional  
UMR 6173 CITERES, Université François Rabelais de Tours/CNRS (France)  
EA 1334 CRESS, Université de Strasbourg (France)  
[bombenger.pierre-henri@courrier.uqam.ca](mailto:bombenger.pierre-henri@courrier.uqam.ca)

**Jean-Philippe WAAUB**

Professor, Geography Department, Université du Québec à Montréal (UQAM, Canada)  
GEIGER, Groupe d'Études Interdisciplinaires en Géographie et Environnement Régional  
GERAD, Groupe d'Études et de Recherche en Analyse des décisions (HEC, Polytechnique, McGill, UQAM)  
[waaub.jean-philippe@uqam.ca](mailto:waaub.jean-philippe@uqam.ca)

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Département de Géographie  
Université du Québec à Montréal  
C.P. 8888, succ. Centre-ville  
Montréal (Québec), H3C 3P8  
Canada

**Abstract:** This paper presents the methodology developed for the experimental implementation of the Integrated Rural Planning System (IRPS) in the Regional Natural Park of Ballons des Vosges. This involves a socio-technical approach aiming at an increased inclusion of sustainable land use planning principles in local urban plans (LUP). This approach is enforced by using standard geographic information system (GIS), simulation of management scenarios and multicriteria decision aid tools. It is tested on three communities developing their LUP inside the Park.

**Résumé :** Cette communication présente la méthode développée pour la mise en œuvre expérimentale du Système Intégré Urbanisme (SIU) dans le Parc naturel régional des Ballons des Vosges. Cette démarche a pour objectif d'accompagner la mise en place de plans locaux d'urbanisme (PLU) intégrant les principes d'une planification rurale durable. Elle s'appuie sur un système sociotechnique intégrant un module d'information géographique (SIG), une interface de simulation de scénarios d'aménagement et un outil d'aide à la décision multicritère. Le SIU est testé sur trois communes du Parc développant actuellement leur PLU.

**Key-words:** Sustainable rural planning, integrated decision support system, collaborative development, construction process of public decision-making, territorial assessment

**Mots-clés :** Aménagement rural durable, système intégré d'aide à la décision, élaboration participative, processus de construction de la décision publique, évaluation territoriale

In most countries of Western Europe, the concept of sustainable urban development is fast becoming a new category of public management (Jollivet, 2001; Hamman, 2009). This urbanism defines principles considered as innovations (Ascher, 2001) in both its goals and in its implementation processes. For many authors (Emelianoff, 1998), sustainable development is fundamentally territorialized, attached to a context historically and geographically situated.

This communication presents the Integrated Rural Planning System approach (or SIU in French for “Système Intégré Urbanisme”), which runs from 2007 to 2010 on the territory of the Regional Natural Park of Ballons des Vosges. This applied research project assesses how local projects of socio-spatial planning in a rural area with high environmental, architectural and cultural value can contribute to shared goals and to more sustainable spatial planning management processes.

The Park is characterized by a strong urban dynamic: since a decade, five square meters of agricultural land are urbanized every minute, aspect of construction is becoming trite, biological corridors are disrupted. In preparation for the third Charter period 2010-2022, the park councilors chose to make sustainable rural planning one of the major challenges of the new project.

In three local communities, researchers and land planners develop and test the socio-technical decision support system IRPS to assist local councilors in developing their local urban plan (LUP, in French PLU for “Plan local d'Urbanisme”). This involves the design of a decision support tool able to facilitate negotiation between multiple stakeholders with diverse interests.

This contribution presents the methodology developed to construct this shared understanding of sustainable urban planning in the Regional Natural Park of Ballons des Vosges. In a first part, we explain the process of developing a concerted land use planning framework (I). Then we present the process of translating the principles at the local level within urban planning projects (II). Finally, in conclusion, we discuss the first results of this experiment still in progress.

## **I. Phase 1: Develop shared principles to be embedded in the Park Charter for designing sustainable local urban plans**

### ***1.1. The Natural Regional Parks and land use planning***

#### *a. A singular mode of intervention in territories*

France has currently 46 regional natural parks (RNPs) covering about 13% of national territory. RNPs are designated to protect and develop open inhabited rural spaces (Federation, 2010). They are recognized for the quality of their cultural, natural and landscape heritage. More specifically, the parks are mandated to protect this heritage; to contribute to the land planning; to contribute to economic, social, cultural development and quality of life; to educate and inform general public; to conduct experimental or exemplary projects in their boundaries and to contribute to research programs.

The governance of regional natural parks is based on the principle of voluntary contracting. The municipalities and their groupings undertake on the basis of a contract called a charter which is renegotiated every twelve years. In return, the label Regional Natural Park shall be issued by decree of the Prime Minister. The RNPs have a technical team and are generally funded by municipalities, state and regions. Unlike other territorial divisions, a regional natural park does not have specific regulatory powers. However, the signatories to the Charter undertake to implement the objectives and specific provisions regarding construction, water management, waste management, traffic, afforestation, etc. The main means of action of the park are education programs, incentives, subsidies, technical support to contracting projects and engineering resources.

#### *b. Urbanism in French rural areas*

Urbanism is defined as the practice of allocating rights to build. In rural areas, land use planning is primarily and often exclusively ending in the preparation of local urban plans (Bombenger, 2006). The organization of the territory does not have others places to be debated. Building permits are signed by the mayor but often prepared by the local state administration.

The rules of the Town Planning Code apply indiscriminately between urban, suburban and rural areas. These small towns are mostly devoid of technical services with responsibility for planning. Based on regulatory dispositions, policy processes remain identical, however, focused around the rhetoric of the project and a prominent technical dimension (Pinson, 2005).

In terms of land use planning, interventions of park take several forms. The park is routinely consulted for advice if equipment or a development inside its boundaries requires an impact assessment. It must be

consulted for advice on the revision of the local urban plan.

Against the effects of urban sprawl, parks develop differentiated policies on issues of territory management (Federation, 2006): initiatives related to the landscape; actions with public like awareness, training, information; approaches related to the planning documents; the operational planning implementation; funds for land planning actions.

The Town Planning Code limits the full enjoyment of private property without compensation from the bondage imposed. In these municipalities with small populations, the social distance between the councilors who take the decision and the landowners who will be advantaged or disadvantaged by a rule or zoning choice is often weak or nonexistent. Arbitration between general and special interests can become complex.

## ***1.2. Example of the Regional Natural Park of Ballons des Vosges***

### ***a. Territorial context and emergence of the IRPS approach***

The Ballons des Vosges Park is one of the largest (300 000 ha), the densest and most populated of the 46 French RNP. Under influences of many cities (Colmar, Mulhouse, Basel, Strasbourg, Nancy, Epinal, Belfort), it undergoes a very significant urban pressure. Even as the population grew only 2.3% over the decade from 1990 to 1999, the artificial surfaces have increased by 13.5% over the same period (Parc, 2010). The territorial impact per new resident is thus becoming stronger. This pressure takes place mainly at the expense of farmland valley bottoms. It induces social, environmental and economic impacts on the natural, cultural and landscape heritage of the park: an increase in land prices leading to a growing alienation of the most vulnerable populations, urbanization of agricultural land requiring an intensification of agricultural inputs to try to maintain forage production, an increase of pendular migrations, a trivialization of buildings architecture, diffusion of pollution in ecosystems and disruption of wildlife and hydraulic dynamics.

In response, the park councilors have decided to make sustainable rural land planning one of the major challenges of the new draft Charter from 2010 to 2022.

The approach has largely evolved according to local circumstances. The first formal discussions to prepare the land use planning chapter of the future Charter dates back to 2005. A group of four expert consultants and four local mayors met four times to propose and imagine, with the park planners, different guidelines for a sustainable urban planning project in the preparation of the future Charter. At the same time, a mayor of municipalities survey about urban planning representations, revealed the gap between the rhetoric developed by the park team of planners and the understanding of local councilors (Bombenger, 2006, 2009).

After an institutional dialogue that has started in October 2006, the formal revision of the Charter began in March 2007. At this time, while discussions on rural planning were still limited, a national symposium entitled “What is sustainable urban design?” was held in May 2005 on the territory of NRP Ballons des Vosges by the Federation of Regional Natural Parks of France.

### ***b. Setting up guidelines for sustainable rural land planning***

This vast territory is characterized by geographic diversity and socio-economic spread over 3 regions and 4 departments. Initially, the approach devised by the park technical team, together with associated researchers, moves towards declining general principles of sustainable land use planning for the park, which results then in territorial criteria, themselves detailed as evaluation indicators. Using various methods of spatial analysis, the goal was to find the relevant scale to define qualitative and quantitative targets for each large areas of the park. This approach has been abandoned for technical, regulatory and political reasons. The Council of State decree of February 27, 2004 specifies that the Charter of NRP is not a planning document since it was not designed primarily to identify and forecast rules concerning land occupancy and land use, and that these provisions are not applicable to third parties which are non-signatories of the Charter, including individuals (BJCL, 2004). Technically, the criteria (density, population, urban structure, urban form, etc.) foreseen to define these large areas have failed to reach a shared consensus between technicians and politicians. Politically, local involved councilors have largely emphasized the need to take into account the particularities of each municipality and do not impose a rigid top-down approach.

Finally, rather a top-down approach, the method is reversed: the Charter sets out principles to take into account and provides coaching to support the local urban plan process. The method developed will evolved as the Integrated Rural Planning System approach (IRPS) and is presented in detail in the second part of this paper.

The development of principles is achieved through panel discussions on territories involving more than 250 local councilors during three months. The development was done by successive iterations; the project is modified each time depending on responses and feedback meetings. It ends up into a specific political project for rural land use planning which is composed by twenty principles divided into four main chapters. After a phase of institutional redesign which will not be described here, the principles are the following: saving the area's

resources, using the characters of territories to develop planning projects, promoting conviviality and vitality, assessing project sustainability over time.

The guidelines contain the land planning principles of the Charter and constitute the cognitive basis for the IRPS approach. These guidelines should be specific to the village's context and meet global sustainable development issues. The IRPS approach is in turn instrumental to support the inclusion of these contextualized general principles of sustainable development into local development plans.

## **II. Phase 2: Translate general principles into urban project and local planning rules**

In March 2009, on the basis of this political project, three villages start testing the IRPS approach by building their LUP. In this second phase, the objective is to effectively translate the apparent consensus around the general concepts of the Charter in the political and municipal-zoning plan opposable to the homeownership. In this phase, conflicts appear between landowners and the strongest opponents to the definition of the right to build.

IRPS experimentation relies on an integrated decision support system for a multicriteria territorial assessment of urban evolution. The urban development scenarios are discussed during the preparation of the local plan. They cover the definition of the location, type and size of new buildings which are primarily residential. IRPS experimentation finds its place in the usual procedural framework for the LUP decision process: a partnership between local councilors, public institutions (Regional Natural Park, local State services, Chamber of Agriculture, etc.) and an urban-planning consultant. IRPS is based on three integrated modules: (I) a GIS module of territorial knowledge aiming at greater involvement of non-specialized stakeholders around the negotiation table; (II) a 3D territorial simulation module helping politicians to look to the future developments; and (III) a territorial multicriteria assessment module based on eleven sustainability criteria proposed by researchers and validated with participants.

### ***2.1. Territorial knowledge module***

The territorial knowledge module has four main objectives in the context of developing the LUP: (1) make geographic information accessible to non-specialists, (2) enrich the information available by integrating the temporal dimension of territorial dynamics, (3) share the information with other project stakeholders by developing a common baseline for spatial analysis, (4) provide a basis for spatial data allowing the establishment of multi-criteria assessment.

The module uses the software ArcGIS. A specific database of land occupations, called Occsol, is developed. It serves as common support for the integration of different thematic layers of geo-referenced information. Originally made up of 6 types (buildings, artificial surfaces mainly permeable, artificial surfaces mainly waterproof, open spaces, woodlands, water areas), Occsol's is essentially characterized to be achievable at the scale of 1: 1 000, to be diachronic (reference years 1980 and 2008), to be methodologically accessible and quickly reproducible in accordance with an experienced protocol (Geomatics Expert, 2008). Information to be integrated into the system concern build environment type, environmental characteristics, agricultural use, network structure of travel, etc.

### ***2.2. 3D territorial simulation module***

While drafting the local urban plan, local councilors and technicians involved are forced to make choices about welcoming newcomers. These choices relate to the location, type and importance of new residential areas. They are made according to the local policy objectives and socio-economics characteristics of the territory. To support local councilors in foreseeing future trends, the IRPS provides an interface for three-dimensional scenario modeling. These simulated scenarios must allow local councilors to visualize their consequences in an image or a video film. The experiment makes it possible to test the level of realism used. If it is possible to simulate different levels of realism, there is a need however to find the appropriate level of representation considering the issues discussed in the LUP. Technically, the three-dimensional modelisation is done using the software Google SketchUp and ArcGIS extensions and is based on the territorial knowledge database module.

### ***2.3. Multicriteria territorial assessment module***

The territorial assessment module is the core of the IRPS. This stage is mobilized because of its ability to enforce coherence and to promote political ownership by clarifying what stakeholders meant by sustainable development (Boutaud, 2004). The evaluation criteria must be simple, easily understood by the greatest number

(1); measurable (2); adapted to the process and to the local context, that is to say the local development plan should have an impact on the targeted endpoint and that the criteria should take into account the specific resources of rural and suburban spaces (3); reproducible, that is to say it should be possible to implement the process (not necessarily an indicator, but the criterion) to another territory (4).

By example, criteria are minimizing agricultural and natural land consumption, preserving the most productive agricultural plots, maximizing the non-automobile use within the village, reducing investment and operation costs of equipment and public networks, maximizing the diversity of urban functions compatible within a same area, maximizing the conviviality of public places, maximizing compliance with the dynamic continuity of wildlife and water.

The multicriteria approach is performed with local councilors. Initially, the proposed criteria are exposed and discussed. They are reviewed, amended, supplemented or deleted during the diagnostic work. They change according to local politicians evolving understanding of their territory. These criteria are primarily raised according to the political will to implement a sustainable development and land use plan. Three LUP scenarios are proposed as a basis for discussion. The software used for multi-criteria analysis is D-Sight which was developed at Université Libre de Bruxelles.

### **Conclusion: Initial results from experiments**

In the first municipality, the implementation of the IRPS process began in March 2009. There is an evolution rather marked of the involvement the local councilors. At the beginning of the procedure, the mayor was often alone; then, the other members of the municipal staff were increasingly present. The content of discussions also changed. The evaluation criteria became grounds for discussion of local councilors seeking initially to illustrate them by concrete local examples in their daily life, then very gradually, as part of their political discourse. To date, while the sustainable development and land use plan is still under discussion, it is clear that the village is moving towards a more proactive scenario than the ideal scenario proposed by the Park and the research team. The reduction potential of urbanization is about 30% compared to the old local urban plan.

Moreover, the concerted development of scenarios with local politicians seems to be at least as important as their territorial assessment. The multicriteria decision aid process is used on an on-going basis during the elaboration of the sustainable development and land use plan. The exercise of comparing the criteria between them seems to provide encouraging results in the definition of a project involving localized sustainability objectives as exposed in the proposed Charter for 2010-2022. Here are a few examples of general principles reflected locally: the open farmland to urbanization will be reduced by more than 10 ha, wetlands and woodlands are classified unconstructable, each district will include a place for conviviality, the definition of a traffic pedestrian-bike network is in progress, building areas required are refocused in a remote area-time less than fifteen minutes round trip with the main services of the village which should encouraged a non-automobile mobility. The IRPS approach will now be used to evaluate the consideration of the project policy objectives of the sustainable development and land use plan in the zoning and regulation phases.

The experiment is called realist: the amplitude of resources mobilized during the test is intended to be reproduced identically in the case of a generalization of the IRPS approach. It seems very clear that the process developed for testing the approach appears to be particularly mobilizing beyond the technical aspect of the modules. In other words, the IRPS approach generates greater involvement of stakeholders in the project area of the municipalities and seems to lead to greater clarification of the concept of sustainable rural land use planning, which was lacking in the more conventional interventions.

The two others municipalities are currently being diagnosed and it seems a little early to take first conclusions. However, some results are already significant. In the second one, the presentation of the IRPS approach outset local councilors to propose other criteria related to the specificities of their village as the integration of an evaluation criterion related to compliance areas of orchards and vineyards.

The tool allows a co-production of information, representations and finally the involvement of stakeholders. Seeking flexibility, better mutual understanding and useful knowledge shared in the negotiation, the IRPS approach provide enhanced local planning efficiency and quality. It also focuses particularly on accountability and personal mutual learning in the understanding of the territory and its future. Through this mediation, stakeholders develop a new standard for local sustainability of urban planning. The question of generalization of the IRPS approach as a framework common to all municipalities of the Park may arise.

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